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# THE FACTORS INFLUENCING THE OUTCOME OF PRESSURE ULCER CARE

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## Summary

**Aim of the study.** The aim of this study was to investigate the existence of relation between the treatment outcome of the occurring pressure ulcer (PU) and the patient's motility, the methods applied to treat incontinence, the use of preventive nursing devices and means of comfort and the different types of applied dressing-materials. Furthermore, we also investigated the possible connections among these factors.

**Methods and materials.** The research was carried out with the use of a longitudinal prospective method. A non-judgement sampling method was applied, on the basis of which the sample size was defined ( $N = 299$ ). The presentation of the results and the investigation of relations among the factors were carried out with the help of descriptive statistic methods (Chi-square test, Pearson-, and Spearman-correlations).

**Results.** The outcome of PU is significantly related to the patient's motility ( $p = 0,002$ ), the applied methods of the treatment of wound ( $p < 0.001$ ). A significant connection could be observed between the motility, the use of static tools and the wounds treatment methods ( $p = 0.021$  and  $p < 0.001$ ). In relation to the use of preventive nursing tools and comfort tools, a significant connection could be found ( $p \leq 0.000$ ).

**Conclusions.** It was verified that evidences were required in case of both the tools that secured exoneration and relief of pressure and the adequate wound treatment methods. Thanks to this study, a little step was made towards the evidence-based nursing.

Key words: pressure ulcer, evidence, nursing, motility, wound care

## INTRODUCTION

The pressure ulcer (PU) is one of the most emphasised elements of the general health care and at the same time it is a health care and nursing quality indicator (1). It is a great challenge that medical experts, the management and financiers have to face. The increase of morbidity leads to the increase of financial expenses of the backers (2). It can cause further frustration for the patient; moreover it can also impair their already lowered quality of life (3, 4). Above of these, it can also have an unfavourable influence on the mood of the care-takers, as the lack of success, the failure and the evident impairment of the patient's health can result in the growth of guilty conscience that can shake the faith in medication and nursing.

There is an international professional agreement in the insistence on prevention. The importance of prevention has been reinforced by research on the sensitivity and specificity of risk assessment scales (5-9), on the propagation and continual development of special

devices that secure exoneration and relief of pressure (6, 10, 11), and it has also been strengthened by further investigations in connection with the general condition of the patient (e.g. nutrition and incontinence) (12).

In contrary to these, the problem of PU is still present. According to estimated data, its incidence rate is about 18% in Europe (13) and 15.2% in the United States of America (14).

The PU has been presented as an indicator of the quality of nursing. The outcome of the health provision is in close relation with the quality of nursing. The quality of nursing depends on the assuring of the personnel conditions, the completion of the controlled process of health provision and the assuring of the available tools and materials.

The hospitals use different nursing protocols in the prevention and treatment of PU. The risk assessment in case of the occurrence of PU is conducted basing on the modified Norton scale that makes the estimation of the patient's health objective with the help of the criteria of

age, levels of cooperation, activity, motility, incontinence, accompanying illnesses, mental state, skin status and general physical condition. Limitation of motion, ataxia, incontinence, which can affect the skin status, and nutrition are very important risk factors in PU development.

Assessing the state of nutrition falls within the competence of the nurses; however, the method applied to corroborate the patient is stated by the assistance of a dietician, but on the basis of the directions for treatment made by the medical attendant.

In order to guarantee the patient's comfort, to prevent the development of pressure ulcer and to secure exoneration and relief of pressure, the use of the following devices is accepted:

- classic means of comfort: water-filled pillows, gloves; air-filled non-special pillows; one-piece foam mattress and pillow made of polyurethane; cut-out or donut-shaped devices made of polyurethane; rings (heel, elbow);
- static preventive means: alternative higher-specification foam mattress; overlay filled with gel; alternating-pressure air mattress and overlay;
- dynamic therapeutic devices: pressure-redistributing mattress or self-adjusting technology air mattress, kinetic beds.

In terms of the wound treatment, the applied methods include traditional methods (e.g. antibacterial debridement, dry dressing and retention), however modern dressing materials and methods (e.g. film-dressing, impregnated-dressing, alginate, hydrogel and hydrocolloid) are also available.

#### AIMS OF THE STUDY

The aim of this study was to investigate the existence of relation between the treatment outcome of the occurring pressure ulcer (PU) and

1. the patient's motility,
2. the methods applied to treat incontinence,
3. the use of preventive nursing devices and tools of comfort,
4. the different types of applied dressing-materials.

Furthermore, we would also like to investigate the possible connections among these factors.

#### MATERIAL AND METHODS

Patients suffering from PU and treated between 1st January and 31st December 2007 in the Kálmán Pándy Hospital, in Gyula took part in this study regardless to the stages and the ways in which PU had developed.

Patients were enrolled in this study basing on the protocol called "The monitoring of decubitus patients" which has already been applied in this institution. According to this, each patient suffering from PU has to be reported to the PU team, which also carries out the monitoring, after the treatment has been ended (with other words, after the patient has left the institution). Every patient who suffered from PU in the year 2007 and who was reported to the PU team in the same year took part in this study.

Within the frame of the descriptive research, we applied a non-judgement sampling method, on the basis of which the sample size was defined at  $N = 299$  individuals.

The research was carried out with the help of a longitudinal prospective method, followed by data processing. Obtained figures were processed with the help of the Microsoft Excel software. The presentation of the results and the investigation of the connections among factors were carried out with the use of descriptive statistical methods [Chi-square test (with a significance level of 5%,  $p \leq 0.05$ ) as well as Pearson-(R) and Spearman-(Sr) correlation tests] using the SPSS 15.0 package.

In the hospital, data obtained during the monitoring of patients was treated in confidence and according to the ethical and legal principles. The director-general and chief medical officer of the institution have contributed to this current publication.

#### RESULTS

In view of the general demographic characteristics of the sample, it can be stated that:

- The average age of the patients participated in this study was 72.3; the median calculated as a potential mean value is 74 years. On the basis of the accompanied calculated quartiles, 25% of the patients were less than 65 years old and 75% of the patients were less than 82 years old.
- The breakdown of sex shows that 38,8% of the patients was men and 61.2% was women.
- The distribution of the PU stages demonstrates that the occurrence of Stage II of PU was dominant (62%), and it was followed by the Stages I (24%), III (8%) and IV (6%).
- In case of 47 patients, more than one type of PU occurred. The sequence of frequency according to the location of the occurrence of PU was following: sacrum (70%), heel, ankle, buttocks and ischium.
- In term soft the most serious outcomes of PU treatment, 42% of the patients showed stagnation, 31% presented worsening, 14% demonstrated improvement, and 13% presented total healing.

In connection with the requirements of the nursing of decubitus patients, the assessment of the patient's motility (and within this, the demand on giving assistance), the treatment of incontinence, the use of preventive nursing devices and/or means of comfort (static or dynamic) and the applied methods of treatment of wound have been investigated:

- All the decubitus patients were completely limited in motility, out of whom 59% were ataxic and therefore they needed complete nursing service;
- In relation to the possible treatments of incontinence, 47% of the patients were catheterised, 34% were catheterised but incontinence pads were also used, and incontinence pads alone were applied in 17% of the investigated cases;
- In order to guarantee the patient's comfort, nurses applied so-called classic means of comfort in

47% of the examined cases, but at the same time they often used preventive means too. Static preventive overlays and devices were applied in 22% and dynamic mattresses and beds were used in 30% of the investigated cases;

- The distribution of the applied dressings showed that 53% of the patients were treated with modern and 16% of the patients received classic dressing methods and materials, while in 31% of the examined cases the combination of these was applied.

In order to establish connection between the outcome of PU (dependent variable) and the treating methods of incontinence, the patient's motility, the treatment of wound, and the use of preventive nursing devices and means of comfort (independent variables), the following can be stated:

- The outcome of PU is in significant connection with the patient's motility ( $p = 0.002$ ), and with the applied methods of treatment of wound ( $p < 0.001$ ); however, there is a very weak positive correlation between these two factors (motility:  $Sr = 0.001$ , treatment of wound:  $Sr = 0.002$ ) (tab. 1).
- Significant connection between the outcome of PU and the use of static means and tools of comfort could not be stated; however, between these two factors a medium or strong positive correlation could be observed (tools of comfort:  $p = 0.499$ ,  $Sr = 0.637$ ; static means:  $p = 0.744$ ,  $Sr = 0.735$ ) (tab. 2).

The correlation matrix presented by the table 3 has to be analysed in order to allow the outline the network of variables. On this basis, it could be stated that

- Among the patient's motility, the use of static means and the applied methods of treatment of wound there is a significant connection ( $p = 0.021$ , and  $p < 0.001$ ), but the correlation between them is rather weak or medium positive ( $R = 0.133$  and  $R = 0.226$ ).
- From the point of view of the use of preventive nursing means, the connection between the use of dynamic means of comfort and static and dynamic devices is significant (in both cases  $p \leq 0.001$ ). In view of the characteristics of this correlation, both cases showed negative medium coefficients ( $R = -0.206$  and  $R = -0.601$ ).

## DISCUSSION

In view of the results of other studies, the average age of the patients who took part in this research is 72,3 years and the dominance of women can also be observed in this study (2, 5, 7, 11).

On the basis of the distribution of the stages of PU, it can be stated that the Stage II of PU occurred in 62% of the investigated cases and this occurred the most often (70%) in the area of the sacrum.

In the research containing  $n=18$  items and carried out by Chan et al. (2009), 74.8% of the patients had Stage II of PU, while 50.1% of the examined ulcer cases

occurred in the coccyx. Defloor and Grypdonck (2005) in their study, which enrolled 1772 patients, presented that the Stage II or more serious stages of PU belonging to the „turning group” occurred in 5,1%, while those belonging to the „non-turning group” occurred in 11.7% of the patients.

Observing the outcome of PU, stagnation or worsening of the cases (42% and 31%) could be noticed; on the other hand improvement (14%) and recovery (13%) could be demonstrated at a very low rate.

Our research was also extended to the investigation on what kind of connection could be outlined between the patient's motility, the applied methods of treatment of incontinence, the treatment of wound, the use of means aiming to secure exoneration and relief of pressure and the outcome of PU as well as the analysis of the connections between the listed factors.

Chan et al. (2009), Gardner et al. (2009) and Cox (2011) showed a significant connection between the motility and the development of PU.

Within the frame of the research, in which  $n = 35$  patients suffering from pressure ulcer took part, Henoch and Gustafsson (2003) demonstrated significant relations between the motility ( $p < 0.001$ ) and the incontinence ( $p = 0.03$ ) towards the development of PU in each case while investigating the modified Norton, Waterlow, Braden and Chaplin risk assessment scales. This significant relation was observed by Defloor, Grypdonck (2005) during the testing of the Norton and Braden scales.

In our study, 59% of the patients suffering from pressure ulcer were ataxic (and needed complete nursing service) and 41% were limited in motility (needed partial nursing service); furthermore all of the patients demanded means available for treatment of incontinence. The relation between the outcome of PU and the motility showed a weak significant characteristic ( $p = 0.002$ ,  $Sr = 0.001$ ). There is no significant correlation between the motility and the use of means available for the treatment of incontinence ( $p = 0.539$ ,  $R = 0.036$ ). That is why, it can be stated that the selection of means available for the treatment of incontinence does not depend on the patient's motility.

In the study of Defloor, Grypdonck (2005), it was stated within the frame of the investigation of the use of means that secure exoneration and relief of pressure after the assessment of risks that preventive tools were not applied in 10.8% of the total number of patients of  $N = 1458$ , which were involved in risks. The applied means including those that secure the patient's comfort were applied only in 5% of the cases. Dynamic, therapeutic means were not used.

A significant relation could be observed between the motility, the use of static means and methods of wound treatment ( $p = 0.021$  and  $p < 0.000$ ). In relation to the use of preventive nursing means and those of comfort, a significant relation could be stated ( $p \leq 0.001$ ). The medium correlation coefficients showing realised negative connection confirm that the use of means of comfort oc-

Table 1. Chi-Square Tests.

<b>Incontinence</b>		<b>Value</b>	<b>df</b>	<b>Asymp. Sig. (2-sided)</b>
Pearson Chi-Square		8,015 <sup>a</sup>	6	,237
N of Valid Cases		292		
a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 6,64.				
<b>Mobility/outcome</b>		<b>Value</b>	<b>df</b>	<b>Asymp. Sig. (2-sided)</b>
Pearson Chi-Square		14,608 <sup>a</sup>	3	,002
N of Valid Cases		299		
a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 16,59.				
<b>Wound therapy/outcome</b>		<b>Value</b>	<b>df</b>	<b>Asymp. Sig. (2-sided)</b>
Pearson Chi-Square		29,879 <sup>a</sup>	6	,000
N of Valid Cases		299		
a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 6,42.				
<b>Instruments of prevention/outcome</b>		<b>Value</b>	<b>df</b>	<b>Asymp. Sig. (2-sided)</b>
Pearson Chi-Square		2,369 <sup>a</sup>	3	,499
N of Valid Cases		299		
a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 10,97.				

Table 2. Symmetric Measures.

<b>Incontinence/outcome</b>		<b>Value</b>	<b>Asymp. Std. Error<sup>a</sup></b>	<b>Approx. Tb</b>	<b>Approx. Sig.</b>
Interval by Interval	Pearson's R	,056	,059	,959	,338 <sup>c</sup>
Ordinal by Ordinal	Spearman Correlation	,056	,059	,959	,338
N of Valid Cases		292			
<b>Mobility/outcome</b>		<b>Value</b>	<b>Asymp. Std. Error<sup>a</sup></b>	<b>Approx. Tb</b>	<b>Approx. Sig.</b>
Interval by Interval	Pearson's R	,213	,057	3,765	,000 <sup>c</sup>
Ordinal by Ordinal	Spearman Correlation	,199	,057	3,501	,001 <sup>c</sup>
N of Valid Cases		299			
<b>Wound therapy/outcome</b>		<b>Value</b>	<b>Asymp. Std. Error<sup>a</sup></b>	<b>Approx. Tb</b>	<b>Approx. Sig.</b>
Interval by Interval	Pearson's R	,164	,053	2,864	,004 <sup>c</sup>
Ordinal by Ordinal	Spearman Correlation	,178	,056	3,120	,002 <sup>c</sup>
N of Valid Cases		299			
<b>Instruments of prevention/outcome</b>		<b>Value</b>	<b>Asymp. Std. Error<sup>a</sup></b>	<b>Approx. Tb</b>	<b>Approx. Sig.</b>
Interval by Interval	Pearson's R	-,038	,055	-,650	,516 <sup>c</sup>
Ordinal by Ordinal	Spearman Correlation	-,027	,056	-,472	,637 <sup>c</sup>
N of Valid Cases		299			
a. Not assuming the null hypothesis.					
b. Using the asymptotic standard error assuming the null hypothesis.					
c. Based on normal approximation.					

Table 3. Pearson Correlations.

		Comfortable equip.	Static equip.	Dinamic equip.	Outcome	Wound therapy	Incontinence	Mobility
Comfortable equip.	Pearson Correlation	1	-,095	-,206**	-,038	-,089	-,046	,030
	Sig. (2-tailed)		,100	,000	,516	,125	,437	,601
	N	299	299	299	299	299	292	299
Static equip.	Pearson Correlation	-,095	1	-,601**	,028	,000	,008	,133*
	Sig. (2-tailed)	,100		,000	,631	,999	,886	,021
	N	299	299	299	299	299	292	299
Dinamic equip.	Pearson Correlation	-,206**	-,601**	1	-,053	,020	,054	-,063
	Sig. (2-tailed)	,000	,000		,359	,731	,356	,280
	N	299	299	299	299	299	292	299
Outcome	Pearson Correlation	-,038	,028	-,053	1	,164**	,056	,213**
	Sig. (2-tailed)	,516	,631	,359		,004	,338	,000
	N	299	299	299	299	299	292	299
Wound therapy	Pearson Correlation	-,089	,000	,020	,164**	1	,062	,226**
	Sig. (2-tailed)	,125	,999	,731	,004		,290	,000
	N	299	299	299	299	299	292	299
Incontinence	Pearson Correlation	-,046	,008	,054	,056	,062	1	,036
	Sig. (2-tailed)	,437	,886	,356	,338	,290		,539
	N	292	292	292	292	292	292	292
Mobility	Pearson Correlation	,030	,133*	-,063	,213**	,226**	,036	1
	Sig. (2-tailed)	,601	,021	,280	,000	,000	,539	
	N	299	299	299	299	299	292	299
**Correlation is significant at the 0.01 level (2-tailed).								
*Correlation is significant at the 0.05 level (2-tailed).								

curs in connection with the use of static and dynamic means, while nurses have the choice between the use of static and dynamic means.

## CONCLUSIONS

The risk assessment scales present a close relationship between the development of PU and the motility, as well as the incontinence. This connection can have a great influence on the outcome of PU treatment from the point of view of motility ( $p = 0.02$ ). Besides the patient's motion, the use of means that secure exoneration and

relief of pressure considering the general health condition of the patient has great importance.

The treatment of wound also shows significant connection with the development of PU ( $p < 0.001$ ), which requires the appropriate use of the treatment of wound according to its stage and localisation.

Obtained results are appropriate for the prevention and nursing of hard treatable wounds and for their installation in relating training programmes (16).

It was verified that evidence is required in case of both means that secured exoneration and relief of pres-

sure and the adequate methods of treatment of wound. With the help of this study, a little step could be made in the direction of the evidence-based nursing. □

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